

TECHNICAL INFORMATION



vitrabond

ALUMINIUM COMPOSITE PANEL / MANUFACTURED BY FAIRVIEW



VALCAN

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Trumpington Community College



Ashford College



MINI - Swindon

ABOUT THIS MANUAL

This manual has been developed to effectively assist fabricators and contractors to work with Valcan Ltd's Aluminium Composite Panel; Vitrabond.

Due to the uncontrollable conditions and methods of job scope, as well as the variable skills and judgment of users/installers and the quality of equipment, tools, etc., the suggestions and recommendations contained in this manual are provided without warranty.

The information and recommendations contained herein are believed to be correct at time of publishing 11/05/2017.

Valcan Ltd reserves the right to revise the contents of this manual.

PREFACE



ALUMINIUM COMPOSITE PANEL / MANUFACTURED BY FAIRVIEW

Radical reappraisals of the form and function of buildings are leading to questions being asked of traditional cladding systems. The emergence of new materials and manufacturing technologies are challenging preconceived notions of the engineered facade. The growing popularity of composite panels in recent years is due to the increasing desire for panels that not only look clean and modern, but also offer rapid installation and provide reliable long-term performance.

Vitrabond Aluminium Composite Panel (ACP) by Valcan Ltd addresses these changing requirements, enabling a modern and high quality envelope construction to be achieved, within the strictest timeframe and budget.

2.2 COMPANY & BACKGROUND

Valcan Ltd specialises in the design, manufacture and distribution of a suite of quality façade solutions throughout the United Kingdom, Australia and North America. With almost 30 years' experience in the façade industry, we are dedicated to consistently facilitating the successful delivery of innovative facades that meet the requirements and vision of each project.

With one of the largest stock holds in the UK, we have the ability to ensure a consistent and timely supply to our dedicated installer network, in addition to this our flexible and innovative approach allows us to work closely with our clients on each project to deliver the best possible outcome. Valcan Ltd continues to develop our range of façade solutions and maintain a high level of service and support to the construction industry.

OUR MISSION

An innovative and proactive organisation, consistently delivering industry leading façade solutions; renowned for excellence of product and superior customer service.

OUR VISION

To lead the industry through facilitating the successful delivery of innovative façade solutions, which stimulate the creativity of building design.



2.3 PRODUCT DESCRIPTION

Vitrabond is composed of two aluminium cover sheets sandwiched with a special homogeneous core material. It is a simple concept, resulting in outstanding surface flatness and high workability, with an excellent strength-to-weight ratio.

Vitrabond is well suited for both exterior and interior architectural applications, as well as for industrial and specialty product designs. Applications include exterior cladding, signage, corporate ID, column covers, interior partitions, canopies, equipment enclosures and kiosks. The creative possibilities of Vitrabond really have no limits.

The versatility, combined with the availability of different panel fixing and jointing methods for vertical and horizontal joints, angles and curves, result in a smooth building envelope with no reduction in surface integrity.

Vitrabond ACP offers a unique combination of features and benefits that few other products can match.

2.4 ADVANTAGES OF VITRABOND

Throughout its history, Vitrabond has been proven to have excellent characteristics in many applications, such as exterior wall cladding, building envelopes, facades, louvers and feature walls. Based upon careful analysis, the key advantages of Vitrabond are listed below:

- Industry leading stock levels and lead times
- Cost effective
- Low maintenance
- Robust durability & strength
- Lightweight
- Large range of standard and stocked colours
- Unlimited colour range available
- Available in Natural Zinc, Stainless Steel, Natural Aluminium and Natural Copper

3.1 MANUFACTURING QUALITY

A dedication to the total fulfillment of our client's and customer's expectations is reflected by a complete quality control system, beginning at the point of specification and continuing through to delivery of the guaranteed products. All activities are carried out in a manner which:

- Uses the framework of ISO9000 Quality Standards to verify the quality of our systems
- Ensures that our products and services are of the highest standards
- Create continuous improvements to our product through the application of the best quality practices.

3.2 ACCEPTABLE VARIATION

Width	± 2.0mm
Length	± 4.0mm
Thickness	± 2% for 3mm and 4mm; 3% for 6mm
Bow	Maximum 0.5% of the length an/or width
Squareness	Maximum 5.0mm
Surface Defects	The surface shall not have any irregularities such as dents, scratches and other imperfections in accordance with our quality assurance.

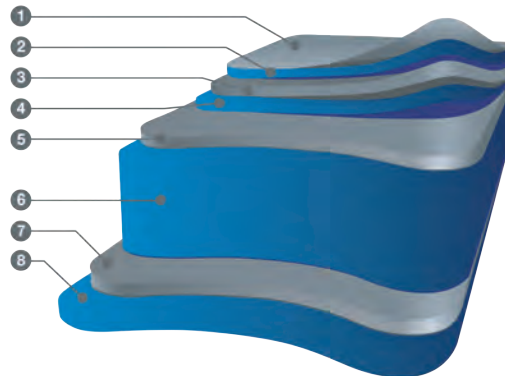
3.3 WARRANTY

The ACP coating warranty is issued on a project specific basis, and is available up to 20 years. Contact Valcan Ltd for warranty details.

MATERIAL PROPERTIES

4.1 TYPICAL COMPOSITION

1. Peel-off Protective Film
2. Clear Coating
3. PVDF Coloured Coating
4. Primer Coating
5. 0.5mm Aluminium Skin
6. 3mm FR core
7. 0.5mm Aluminium Skin
8. Polyester Anti-corrosion Coating



4.2 ALUMINIUM SKINS

Surface material both sides: 0.5mm Aluminium sheets of a minimum 3000 series grade.

4.3 CORE MATERIAL

The standard Fire Retardant (FR) core is a mineral filled core, the key component being the compound Aluminium Hydroxide.

4.4 DIMENSIONS

- Available thickness: Standard 3mm, 4mm (stocked), 6mm. Custom thickness available.
- Panel width: Standard 1250mm, 1570mm. Custom 900-1800mm.
- Panel Length: Standard 2500mm, 3200mm, 4000mm. Custom max 6500mm.

4.5 WEIGHT

THICKNESS	WEIGHT (kg/m ²)
3mm	5.8
4mm	7.3
6mm	10.3

4.6 TECHNICAL DATA

CLASSIFICATION	TEST STANDARD	UNIT	4mm VITRABOND/FR
Panel Weight		kg/m ²	7.3
Core Density	ASTM C271	kg/m ³	
Limit of Application		°C	
Tensile Strength	ASTM E8	kg/m ²	5.15
Yield Strength	ASTM E8	kg/m ²	12.7
Elongation	ASTM E8	%	7.1
Flexural Stiffness (250mm span)	ASTM C393	kg/m ²	6.7x10 ⁸
Flexural Elasticity	ASTM C393	kg/m ²	3666
Deflection Temperature:	ASTM D648	°C	116
THERMAL			
Thermal Expansion	ASTM D696	x10 ⁻⁶ / °C	24
Thermal Conductivity	ASTM D976	Kcal/mhr °C	0.39
BOND INTEGRITY			
> Vertical Pull	ASTM C297	N/mm ²	5.9
> Drum Peel	ASTM D1781	mmN/mm	368.7
> Flat Shear	ASTM D1002	N/mm ²	6.84
SOUND			
Sound Isolation Rate	ISO140/3	500Hz	RW-26
		1000Hz	RW-29
Sound Reduction STC	ASTM E90	4.5-4KHz	25
ALUMINIUM SKIN			
Tensile Strength		N/mm ²	Rm140
0.2% Proof Stress		N/mm ²	Rp0.2100
Elongation (50mm)		%	A501

5.1 STOVE LACQUERING

Vitrabond only uses the highly recognised PVDF KYNAR 500, FEVE or VITREFLON V700 paints known for their high durability. These premium paints provide an optimum resistance to weather and industrial pollution. More than 40 years of South Florida Exposure Testing is continuing to confirm the superior chemical and physical properties of fluoro polymer coatings.

Vitrabond has unlimited colour options, we are able to match any colour, from any other colour range. For a full list of standard Vitrabond colours, refer to the latest Vitrabond Colour Chart.

5.2 ANODISING

Vitrabond panels come in a range of Anodised finishes, offering both standard and customised colours and textures. It is possible to re-anodise Vitrabond in custom colours or designs. Contact Fairview for more information.

5.3 NATURAL FINISHES

Fairview offers the following natural finished panels:

- Vitrabond/ZN - Natural zinc composite panel
- Vitrabond/CU - Natural copper composite panel
- Vitrabond/SS - Stainless steel composite panel
- Natural Aluminium Vitrabond - uncoloured aluminium finishes

5.4 OTHER COATING FINISHES

The Vitrabond range also offers the following finishes:

- REPEL - A self-cleaning surface coating
- STATIC DISSIPATIVE (very low outgassing) Surface Coating - Designed for IT industries
- ANTI-BACTERIA Coating - to meet food handling and storage requirements
- SCREEN PRINTING for personalised design and imagery

For an ultra-durable vitreous enamel coated panel, please refer to 'Vitranamel', another Valcan Ltd product.

5.5 TECHNICAL DATA OF KYNAR 500 PVDF COATING

CLASSIFICATION	TEST STANDARD	RESULT	REMARKS
Substrate	ASTM D1005	Pass	Aluminium
Flexibility	ASTM D4145 ECCA T7 NCCA 11-19	Pass	1~2T - No Cracking
DFT	ASTM D1400 ASTM D1005 NCCA 11-13, 14, 15	Pass	
Colour Difference	ASTM 2244	$\Delta E < 5$	4000hrs
Gloss Meter	ASTM D523	Pass	
Gloss Retention	ASTM 2244	85%	4000hrs
Chalking Resistance	ASTM 2244	<8 units	4000hrs
Pencil Hardness	ASTM D3363		
Dry Film Adhesion Wet Adhesion Hot Adhesion		Pass Pass Pass	38°C, 24hrs 100°C, 24hrs
Reverse Impact Resistance	ASTM D2794	No Cracking	12.7mm x 0.5kg x 500mm
Bending/Gardner Impact	ASTM D3281	Pass	Normal
Solvent Resistance	ASTM 2794	Pass	MEK double rubs
Acid Resistance	ASTM 1308	Pass	7 days soaking in 10% H ₂ SO ₄
Alkali Resistance	ASTM 1308	Pass	7 days soaking in 10% NaOH
Detergent Resistance	ASTM D2248	Pass	72 hrs soaking in 3% detergent
SALT RESISTANCE	ASTM B117	Includes the following:	
Gloss Retention	ASTM D523	0.8% change	5000hrs
Colour Retention	ASTM 2244	$\Delta E < 0.68$	5000hrs
Chalk Resistance	ASTM 4214	Rating: 10	Top rating - no chalk (5000hrs)
HUMIDITY RESISTANCE	ASTM D714	PASS	2000hrs
	ASTM B117	Includes the following:	
Gloss Retention	ASTM D523	No visible change	5000hrs
Colour Retention	ASTM 2244	$\Delta E < 0.52$	5000hrs
Chalk Resistance	ASTM 4214	Rating: 10	Top rating - no chalk (5000hrs)
WEATHERING RESISTANCE	ASTM G53	Includes the following:	
Gloss Retention	ASTM D523	6.2% Change	5000hrs
Colour Retention	ASTM 2244	$\Delta E < 0.27$	5000hrs
Chalk Resistance	ASTM 4214	Rating: 10	Top rating - no chalk (5000hrs)
CHEMICAL RESISTANCE	ASTM C207	Pass	Mortar, 24hrs
	ASTM D1308	Pass	10% HCl, 15 min
		Pass	70% HNO₃ Vapours, 30 min
		Includes the following:	
Gloss Retention	ASTM D523	6.2% Change	16hrs
Colour Retention	ASTM 2244	No Change	16hrs
Chalk Resistance	ASTM 4214	Rating: 10	Top rating - no chalk (5000hrs)

FIRE RESISTANCE

The Fire Resistance standards achieved with Vitrabond FR are as follows:

EN13501-01		B-s1, d0	
BS BBA 4901	Pass		
BS 476.6	Pass	Index of overall performance	0.0
BS 476.7 class 1	Pass	Spread of Flame	0
ASTM E 84	Class 2 or B	Flame Spread Index	45
		Smoke Development	250
A/NZS 3837	Group 4		
ASTM E 84	Class 1 or A	Flame Spread Index	10
		Smoke Development	20
ISO 9705	Group 2		
NFPA 285	Pass		
A/NZS 3837	Group 3		

Vitrabond FR can generally be used on a performance basis to meet fire resistance requirements. However, for a product appropriate for use where non-combustible material is required, see Valcan Ltd's Vitracore G2 non-combustible 4mm composite panel by Valcan Ltd, tested to EN13501-01.



University of Derby Sports Centre

WINDLOADING



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Capacities based on material properties taken from AS1664.1 and verified by tests provided by Fairview Architectural.

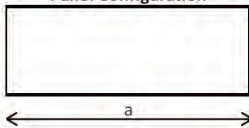
Vitrabond ACP Properties

$E =$	70000 MPa	Elastic modulus
$t =$	4.0 mm	Overall thickness of ACP
$t_i =$	0.5 mm	Aluminium cover sheet thickness
$I =$	3083 mm ⁴ / m	Second moment of area per m width
$Z =$	1542 mm ³ / m	Section modulus per m width
$\phi F_u =$	82.875 MPa	Design flexural strength

Comments

Elastic modulus
Overall thickness of ACP
Aluminium cover sheet thickness
Second moment of area per m width
Section modulus per m width
Design flexural strength

Panel Configuration



b = span of panel
 a = length of panel
 (Max. a = 4000mm)

Substructure minimum steel specification

$F_y =$	270 MPa
$F_u =$	350 MPa
$t =$	1.15 mm BMT

Serviceability Limit = SPAN/150

			Limiting Pressure		Screw capacity, ϕN_{ou} (kN) to AS4600			
Panel Width b (mm)	Panel Length a (mm)	Ratio a/b	Strength p_u (kPa)	Serviceability p_s (kPa)	0.718	0.821	0.941	1.078
					Max. spacing of screws fixing cassette to substructure (mm)			
					No.8	No.10	No.12	No.14
400	400	1.0	9,000	9,000	200	225	260	300
	600	1.5	9,000	5,438	200	225	260	300
	800	2.0	9,000	4,194	200	225	260	300
	1000	2.5	9,000	3,751	200	225	260	300
	1200	3.0	9,000	3,555	200	225	260	300
600	600	1.0	9,000	3,126	130	150	170	200
	900	1.5	7,254	1,611	160	185	215	245
	1200	2.0	5,899	1,243	200	230	265	300
	1500	2.5	5,417	1,111	220	250	285	300
	1800	3.0	5,204	1,053	225	260	300	300
900	900	1.0	5,697	0,926	140	160	180	210
	1350	1.5	3,224	0,477	245	280	300	300
	1800	2.0	2,622	0,368	300	300	300	300
	2250	2.5	2,408	0,329	300	300	300	300
	2700	3.0	2,313	0,312	300	300	300	300
1200	1200	1.0	3,205	0,391	185	210	240	280
	1800	1.5	1,813	0,201	300	300	300	300
	2400	2.0	1,475	0,155	300	300	300	300
	3000	2.5	1,354	0,139	300	300	300	300
	3600	3.0	1,301	0,132	300	300	300	300
1500	1500	1.0	2,051	0,200	230	265	300	300
	2250	1.5	1,161	0,103	300	300	300	300
	3000	2.0	0,944	0,080	300	300	300	300
	3750	2.5	0,867	0,071	300	300	300	300
	4000	2.7	0,852	0,070	300	300	300	300

Stiffeners can be used for panel configurations that do not meet the serviceability criteria where strength is satisfied.

Stiffener to be 32x25x3.0mm U-section of A6005-T5 or A6105-T5 material fixed to the back of the Vitrabond ACP with a continuous strip of 25mm wide 3M VHB tape 4956.

Vitrabond ACP Fixing Specification:

A: Rivets / Cassette	Minimum dia. 5mm rivets for fixing the Vitrabond ACP to Z-section rails. Minimum 3 rivets per side, not including rivet securing the corner fold. Maximum spacing of rivets - 300mm. Minimum 25mm edge fold in Vitrabond ACP sheet. Minimum edge distance to edge of hole in Vitrabond ACP $e = 2xd_f$ ($= 10mm$ for 5mm rivet).
B: 3M VHB Tape / Flat Panel	Continuous substrate support is to be provided. Minimum 25mm wide 3M VHB tape 4956 in a continuous strip to all four panel edges. Prepare surfaces as per 3M specifications before applying tape.

Note: Extract from Enertren engineering assessment FAR-002. Please refer to the said document for design and construction notes.

THERMAL PERFORMANCE

8.1 THERMAL INSULATING PROPERTIES

THERMAL RESISTANCE		
FROM -50°C to +80°C		
Panel Thickness (mm)	Thermal Resistance 1A m ² .K/W	Heat Transmission Coefficient W/(m ² .K)
3	0.0069	5.65
4	0.0103	5.54
6	0.0172	5.34

8.2 AVERAGE EXPANSION

MATERIAL	EXPANSION COEFFICIENT (x10 ⁻⁶ /°C)	ELONGATION PER 1000mm $\Delta T=50^{\circ}\text{C}$
Vitrabond	23.8	1.2
Aluminium	23.8	1.2
Zinc	26.7	1.3
Steel	12.2	0.6
Concrete	12	0.6



COMPONENTS

All components are available from Valcan Ltd in the Vitrafix installation accessories range for simple order and supply.

COMPONENTS	INSTALLATION TYPE		VITRAFIX CODE
	CASSETTE FIX	TAPE FIX	
3M™ VBH™ 491F/495F Tape		☑	3M4991F / 3M957
3M™ VBH™ 4941F Tape	☑	☑	3M4941
HBF100 Silicone (or equivalent)	☑	☑	HBF100
Aluminium Z-Angles	☑		AZ4025 (high) AZ2310 (low)
Steel Tophats	☑	☑	T1550/15 (15mm) T2050/24 (24mm) T2050/35 (35mm)
Aluminium Stiffener	☑		ASR2819
Aluminium Angle	☑		AAL3203
Screws	☑	☑	SHQ208
Sparking	☑	☑	M1000

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FABRICATION METHODS

10.1 CUTTING



Vitrabond can be cut with a wall-saw, circular saw, bandsaw or jigsaw. The requirements for a circular saw are as follows:

The cutting tool material to be carbide tipped, thickness 2-4mm	
Tooth geometry:	Trapeze/flat
Tooth pitch:	10-12mm
Rake Angle:	5° (positive)
Clearance Angle:	15°
Max cutting speed:	500m/min
Max feed speed:	30m/min

10.2 CONTOUR CUTTING



Vitrabond panel can be contour cut with water jets, CNC routers, copy routers and jigsaws.

10.3 ROUTING/FOLDING



Vitrabond panel can be cold shaped, enabling it to form various shapes and sizes. A rectangular or V-shaped groove can be routed on the back of the panel, following potential fold lines. A thin layer of core should remain at the base of the groove. The panel can then be hand folded along this groove, creating a precise and even fold. The outer radius of the fold can be determined by the shape and width of the routed groove.



There must be between 0.3mm and 0.5mm of core material left at the base of the routed groove. Too much material can cause delamination at the corner and result in a larger radius fold than desired. It will also make folding the panel more difficult and prevent the required fold angle from being obtained.

10.4 SHEARING



Shearing can be done with a guillotine. Ensure the blanking tools are padded. Shearing causes a slight roll down along the cut edge of the panel cover sheet.

10.5 PUNCHING



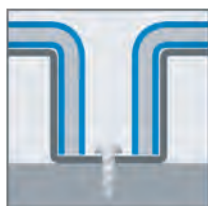
The punching of flat formed parts from Vitrabond is performed in the same way as a solid aluminium sheeting, using sharp tools and dies with minimal cutting clearance. Varying shapes may easily be punched with normal aluminium punching machinery. As with shearing, a slight roll down may occur.

10.6 ROLL BENDING



Vitrabond panel can be bent with a roll-bending machine. Use polished rollers free of imperfections only.

10.7 SCREWING



Vitrabond can be screwed with conventional stainless steel or galvanised screws for wood and metal. For outdoor use allow for thermal expansion.

10.8 RIVETING



Riveting is possible with the usual equipment and solid rivets or blind rivets. For outdoor use allow for thermal expansion.

10.9 DRILLING



Vitrabond panel can be drilled with centre point twist drills normally used for aluminium and plastics or machines common for metals. Drill material: High-Speed Steel (HSS).

10.10 BENDING



Bending is possible with a folding table or brake press. The inside bending radius is roughly 10 times the Vitrabond panel thickness. Use protective foils. There is more spring-back effect than with solid aluminium sheet. For serial production, tests should be made on sample panels.

10.11 GLUING



Usual metal adhesives or double sided VHB tape should be used. There is low adhesion to the plastic core.

EDGE CLOSE-OUT & TREATMENT DETAILS

Vitrabond panel edges can be closed out as per below details:



A



B



C



D



E



F

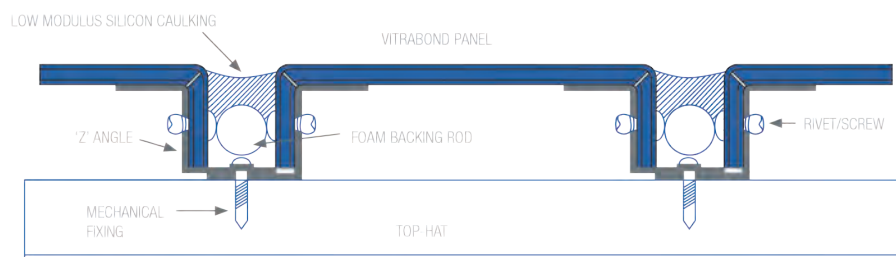
INSTALLATION



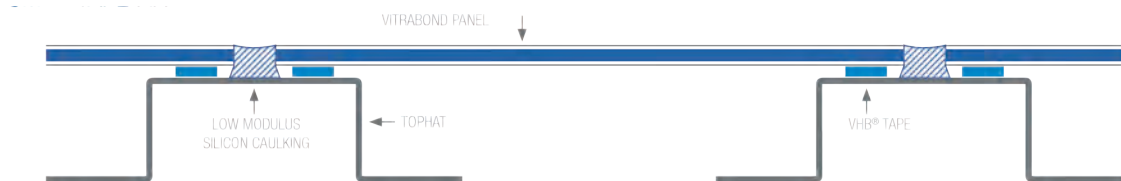
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CASSETTE FIX



3M™ TAPE FIX



It is also possible to Screw or Rivet Fix the VITRABOND.

It is also possible to Screw or Rivet Fix the Vitrabond.

See the Vitrabond Installation manual for details

The Vitrabond installation details are provided for conceptual purposes only. These are not the only methods that can be used to attach Vitrabond, nor can they be used generically without consideration for each individual application. Good design engineering may preclude the choice of details used.

INSTALLATION GUIDELINES

- All sheets should be installed in the same direction as marked on the protective film to prevent possible finish variation
- As minor colour variation can occur between production lots, it is recommended to place total requirement for a project in one order to ensure colour consistency
- Where aluminium materials come in contact with dissimilar metals, a proper insulator or isolation tape should be applied to insulate between dissimilar materials in order to avoid corrosive and electrolytic action
- For Cassette Fix, the bend-in portions between panel joints should not be caulked before strippable film is removed.

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ALUMINIUM COMPOSITE PANEL / MANUFACTURED BY FAIRVIEW

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